Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Allocation of Spectrum Below	)	ET Docket No. 94-32
5 GHz Transferred from	)	
Federal Government Use	)	

REPLY COMMENTS

Apple Computer, Inc. ("Apple") hereby submits its reply comments in response to the Second Notice of Proposed Rulemaking ("Second NPRM") in the above-captioned proceeding. Specifically, Apple addresses the comments regarding the 2390-2400 MHz band, which the Commission has allocated to unlicensed asynchronous PCS devices, or "Data-PCS."

The comments reflect broad support for the Commission's allocation of the 2390-2400 MHz band to Data-PCS. Both prospective users of the band and their sharing partners (Amateur users, who also operate in the 2390-2400 MHz band, and representatives of the space research community, which employs spectrum adjacent to this band) described the benefits of the FCC's decision and stated their general support for retaining the existing rules governing this band.

I. THE COMMISSION SHOULD NOT COMBINE THE 2390-2400 MHZ DATA-PCS BAND WITH THE 2400-2483.5 MHZ ISM BAND FOR USE AS A SINGLE PART 15 BAND.

The commenting parties almost universally opposed combining the 2390-2400 MHz Data PCS band and the 2400-2483.5 MHz ISM band, as well as other, more limited changes to permit increased interoperability between the bands.

Several parties echoed Apple's concern that such changes would ignore the distinct attributes of the two bands and the unique characteristics of the devices designed to operate in each.[1] Commenting parties recognized the importance of the etiquette governing the 2390-2400 MHz band, and discussed

[1] See Comments of AMSAT at 2-3.

the adverse effect of any rule change that would permit non-etiquette-compliant devices into the Data-PCS band.[2] In particular, the rules adopted for the Data-PCS band were developed explicitly for asynchronous (data) communications.[3] As yet, there have been no technologies identified, and no etiquette derived, to allow isochronous (voice) communications and asynchronous data to share a restricted bandwidth such as this 10 MHz dedicated for Data-PCS. Isochronous transmissions, which cannot comply with the asynchronous etiquette, cannot be permitted in the 2390-2400 MHz band without destroying the utility of the band for data.

Moreover, both Amateur users and potential providers of Data-PCS devices expressed concern that such a change could cause manufacturers of diverse Part 15 devices operating in the ISM band to migrate downward into the 2390-2400 MHz band, given the latter's relatively light use at this time and freedom from the highest levels of interference from ISM devices. This migration could quickly inundate the Data-PCS band.[4]

In any event, if the Commission retains the existing rules for each band there will still be ample opportunity for devices to operate in both bands. As Apple noted in its comments, such cross-operability would be permitted, for example, if a Part 15 device could meet the requirements of both sets of rules, or if it would be designed to change operating modes so that each transmission conforms to the rules governing the band in which the transmission occurs.[5]

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2 See Comments of Compaq at 6.

3 The rules of Section 15.247 describe only a modulation technique: spread spectrum. They do not in any way describe or require channel access or usage constraints, or any band-sharing issues whatsoever.

4 E.g. Comments of AMSAT at 2-3; Comments of ARRL at 7.

5 To the extent that AT&T would permit cross-operability on this basis — i.e., that a spread spectrum Part 15 device could operate in the 2390-2400 MHz band if it obeyed the spectrum etiquette set forth in Section 15.321, and a Data-PCS device could operate in the 2400-2583.5 MHz band if it obeyed the rules set forth in Sections 15.247 and 15.249 —Apple agrees with AT&T. See Comments of AT&T at 3 ("The Commission's rules should require asynchronous PCS devices to obey the spread spectrum rules between 2400 and 2483 MHz. Correspondingly, spread spectrum devices operating below 2400 MHz should be required to obey the spectrum etiquette rules in § 15.321.") To the extent that AT&T is suggesting that the rules governing each band be weakened to permit greater interoperability, AT&T has failed to describe the conditions under which such inter-operation would be permitted, or to recommend technical standards that would preserve the Data-PCS band's etiquette, and therefore its suggestion should be rejected.

II. ONLY RELATIVELY MINOR RULE CHANGES ARE NEEDED TO PROTECT SPACE RESEARCH OPERATIONS.

As Apple anticipated, Cornell University's National Astronomy and Ionosphere Center ("NAIC") and the National Academy of Sciences (through the Committee on Radio Frequencies of the National Research Council) ("CORF")) were pleased with the Commission's decision to allocate the 23490-2400 MHz band to Data-PCS and view Data-PCS as a complementary user of the spectrum.[6]

In general, these parties do not recommend that the FCC modify the rules governing Data-PCS devices in order to protect space research operations. Like Apple, they believe that most Data-PCS uses will not pose a significant interference threat and that a dialog between interested parties, rather than burdensome regulations, will best address the relatively few areas of concern.

In particular, both Cornell/NAIC and CORF recommend that interested parties continue to address the potential for interference from spurious and out-of-band emissions from Data-PCS devices, with a view toward determining whether further restrictions are needed and, if so, to develop specific recommendations for such restrictions.[7] Apple, therefore, urges the Commission to keep the rules unchanged at this time and reiterates its commitment to continue working with interested parties on this matter.

With respect to the ban on aeronautical use, Apple agrees that such a restriction is warranted, but wishes to clarify that such a prohibition can only be imposed upon users, rather than manufacturers. It is virtually impossible to envision how a manufacturer could integrate a disabling mechanism in a Data-PCS device that would prevent it from transmitting in the 2390-2400 MHz band during flights in a singular locale. Sufficient protection to Arecibo would be provided by a user restriction (which could be set forth in the FCC's rules, in

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See Second NPRM at ¶ 55. The Commission should clarify in its Order that inter-operation as described by Apple is not prohibited by Section 15.321(a).

[6] See Comments of Cornell/NAIC at 2 ("Cornell considers the Amateur and Part 15 devices to be the best choice for protecting the planetary observations and preserving the integrity of the allocation structure in these bands."); Comments of CORF at 3.

[7] Comments of Cornell/NAIC at 3; Comments of CORF at 5-6.

Data-PCS instruction manuals, and in General Aviation flight materials), especially in light of restrictions on airborne transmissions that may be imposed by airlines.[8]

Finally, Apple agrees that Data-PCS devices should not be operated in a manner that causes interference to Arecibo, but it does not believe that a specific regulatory prohibition on such interference is required.[9] Under Section 15.5(b) of the FCC's Rules, all Part 15 devices — including Data-PCS devices — operate subject to the condition that they not cause harmful interference to other spectrum users. Apple therefore believes that a new, Arecibo-specific provision is not necessary, and could be confusing to users by muddying Section 15.5(b)'s clear, broad requirement.[10]

III. NO CHANGES TO THE DATA-PCS RULES ARE NEEDED TO PROTECT AMATEUR USERS.

Like representatives of the space research operations, the major representatives of Amateur users applauded the FCC's allocation of the 2390-2400 MHz band. These entities expressed their belief that, among the several possible new users of the band, Data-PCS operations will be most able to share the band with Amateur users, without any changes to the existing Data-PCS rules or the imposition of burdensome prior coordination requirements.[11]

A few commenters raised questions about sharing risks or suggested further restrictions on Data-PCS operations to protect Amateur users. Several of these recommendations are based upon a lack of understanding of the existing restrictions under which Data-PCS devices will operate, and in some cases fail to recognize that unlicensed, low power, Part 15, Data-PCS is quite different from

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[8] Apple also requests that the ban on aeronautical use apply only to flights passing in the vicinity of Arecibo and only to devices operating in the 2390-2400 MHz band.

[9] See Comments of CORF at 5; Comments of Cornell/NAIC at 3.

[10] The particular concerns of Cornell/NAIC about interference from fixed point-to-point Data-PCS links could be addressed in a manner similar to the way hams and astronomers are resolving interference problems; that is, by local frequency coordination. Nomadic devices operating in the vicinity of Arecibo will not, however, necessarily be coordinatable. As noted *supra*, tests and other measures may be required in order to address out-of-band emission limits for Data-PCS devices.

[11] Comments of AMSAT at 2; Comments of ARRL at 2-6; Comments of SCRRBA at ¶¶ 3, 4, 6, 15; see also Comments of Compaq at 2-4; Comments of Motorola at 11.

licensed, wide area, high power, primary-status PCS. Moreover, they seem to presume that manufacturers and/or users will violate the existing rules, and therefore conclude that additional restrictions are required to protect Amateur operators from interference.

Rather than respond to a "parade of horribles" or hypothetical scenarios, Apple strongly urges the FCC to permit Amateur operators and Data-PCS users to proceed under the existing rules, to develop informal methods for resolving any problems that may arise, and to return to the Commission for further regulation only if actual problems are discovered that cannot be resolved between the interested parties.[12]

Similarly, the proposals for creating a "protected band" within the 2390-2400 MHz band and the adjacent ISM band, from which Data-PCS and other Part 15 devices would be excluded (either temporarily or permanently), or within which these devices would be permitted to operate only at even more severely reduced power levels, are neither practical nor necessary.[13] These suggestions do not address sharing standards or propose restrictions on any particular potential interference source; rather, they seek to reverse the allocation decision already made by the FCC, and therefore are not properly before the Commission.

Moreover, proposals to partition the 2390-2400 MHz band and to allocate a portion of this spectrum exclusively to Amateur users would be unwise as a matter of policy. In the FCC's PCS proceeding, Apple and other commenting

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[12] On a related note, AT&T warns that the nature of Amateur operations in the 2390-2400 MHz band could change because these operations will no longer be constrained by "superior" government operations and that, therefore, the Commission should "defer" decisions. See Comments of AT&T at 4-5. Apple and many representatives of the Amateur community previously concluded that sharing between Amateurs operators and users of Data-PCS devices will be possible based upon Amateur operators' current and projected uses of the band. Naturally, if the nature of such use changes significantly in the future, the Commission may need to revisit the rules for band sharing.

[13] E.g. Comments of AMSAT at 3; Comments of NARCC at 5; Comments of SBMS at ¶¶ 11, 18-19; Comments of SCRRBA at ¶ 13. Some of the parties seek a guard band dividing the 2390-2400 MHz band from the 2400-2483.5 MHz band; others seek an exclusive allocation of the 2390-2391 MHz band for Amateur users, which would be returned to Data-PCS only if the FCC allocates the 2300-2310 MHz band exclusively to Amateur operations. Although Apple specifically addresses only the proposals to reduce the Data-PCS allocation, it also opposes any effort to reduce Part 15 use of the 2.4 GHz ISM band.

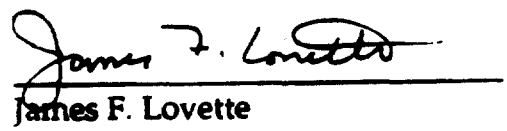
parties have documented the need for a 20 MHz allocation for Data-PCS, and, in particular, the need for an initial 10 MHz of "clear" spectrum (*i.e.*, spectrum that is free from users that will suffer interference from, or cause interference to, Data-PCS). The FCC has previously recognized the spectrum needs of Data-PCS, and in allocating the 2390-2400 MHz band and defining the relationship between Amateur and Data-PCS operations it struck the proper balance between these users. The Commission should not now reverse this decision and jeopardize the development of Data-PCS by taking away a portion of the spectrum allocated to this important new service.[14]

CONCLUSION

For the reasons stated above, Apple respectfully requests that the Commission take the actions discussed herein.

Respectfully submitted,

APPLE COMPUTER, INC.



James F. Lovette
One Infinite Loop, MS: 301-4J
Cupertino, California 95014
(408) 974-1418
jlovette@apple.com

Henry Goldberg
Mary Dent
GOLDBERG, GODLES, WIENER & WRIGHT
1229 Nineteenth Street, N.W.
Washington, D.C. 20036
(202) 429-4900

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14 Amateur operators' need for clear spectrum should be a major topic for Amateurs to address in the context of allocating the 2300-2310 MHz band, which is in the process of being transferred from government to private use.

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing Reply Comments was sent by first-class mail, postage prepaid, this 4th day of April, 1995, to each of the following:

Mr. Burton G. Tregub
Cylink Corporation
910 Hermosa Court
Sunnyvale, California 94087

Mr. Charles Brown
Tetherless Access Ltd.
2468 Embarcadero Way
Palo Alto, California 94303

Henrietta Wright, Esq.
W. Kenneth Ferree, Esq.
Goldberg, Godles, Wiener & Wright
1229 Nineteenth Street, N.W.
Washington, D.C. 20036
Counsel for Part 15 Coalition

Mr. Bruce Perens
Northern California Packet Association
c/o Pixar
1001 W. Cutting #200
Richmond, California 94804

Mr. Victor Tawil
Association for Maximum Service Television, Inc.
1776 Massachusetts Avenue, N.W.
Suite 300
Washington, D.C. 20036

Gregory M. Schmidt, Esq.
Ellen P. Goodman, Esq.
Covington & Burling
1201 Pennsylvania Avenue, N.W.
P.O. Box 7566
Washington, D.C. 20044
Counsel for Association for Maximum Service Television, Inc.

Robert M. Gurss, Esq.
Wilkes, Artis, Hedrick & Lane, Chartered
1666 K Street, N.W., #1100
Washington, D.C. 20006
Counsel for Association of Public-Safety Communications Officials-International, Inc.

Christopher D. Imlay, Esq.
Booth, Freret & Imlay
1233 20th Street, N.W.
Suite 204
Washington, D.C. 20036
Counsel for The American Radio Relay League, Incorporated

Mr. Mark J. Golden
Personal Communications Industry Association
1019 19th Street, N.W.
Suite 1100
Washington, D.C. 20036

David E. Weisman, Esq.
Alan S. Tilles, Esq.
Meyer, Faller, Weisman and Rosenberg, P.C.
4400 Jenifer Street, N.W.
Suite 380
Washington, D.C. 20015
Of Counsel for Personal Communications Industry Association

Mr. Carl Guastaferro
Northern Amateur Relay Council of California Inc.
P.O. Box 60531
Sunnyvale, California 94088-0531

Mr. William A. Tynan
Radio Amateur Satellite Corporation
P.O. Box 27
Washington, D.C. 20044

Paul J. Sinderbrand, Esq.
William W. Huber, Esq.
Sinderbrand & Alexander
888 Sixteenth Street, N.W.
Fifth Floor
Washington, D.C. 20006-4103
Counsel for Wireless Cable Association International, Inc.

Mr. William A. Burns
247 Rebel Road
Ridgecrest, California 93555

Paul J. Feldman, Esq.
Fletcher, Heald & Hildreth, P.L.C.
1300 North 17th Street, 11th Floor
Rosslyn, Virginia 22209
Counsel for Cornell University and National Academy of Sciences' Committee on Radio Frequencies

R. Michael Senkowski, Esq.
Wiley, Rein & Fielding
1776 K Street, N.W.
Washington, D.C. 20006
Counsel for Motorola, Inc.

Mark C. Rosenblum, Esq.
Kathleen F. Carroll, Esq.
Ernest A. Gleit, Esq.
AT&T Corp.
Room 3261B3
295 North Maple Avenue
Basking Ridge, New Jersey 07920

Joseph A. Tasker, Jr.
Compaq Computer Corporation
1300 I Street, N.W., 490 East
Washington, D.C. 20005

Ian D. Volner, Esq.
William Coston, Esq.
Venable, Baetjer, Howard & Civiletti
1201 New York Avenue, N.W.
Suite 1000
Washington, D.C. 20005
Of Counsel for Compaq Computer Corporation

Mr. Matthew J. McCoy
Mr. George A. Hanover
Consumer Electronics Group
Electronic Industries Association
2001 Pennsylvania Avenue, N.W.
Washington, D.C. 20006

Joseph P. Markoski, Esq.
Mark Berejka, Esq.
Jeffrey A. Campbell, Esq.
Squire, Sanders & Dempsey
1201 Pennsylvania Avenue, N.W.
Post Office Box 407
Washington, D.C. 20044
Of Counsel for Consumer Electronics Group, Electronic Industries Association
Counsel for Norand Corporation

Mr. Stuart E. Overby
Motorola, Inc.
1350 I Street, N.W.
Washington, D.C. 20005

M. Robin Critchell
Southern California Repeater and Remote Base Association
P.O. Box 5967
Pasadena, California 91117

Lawrence W. Katz, Esq.
The Bell Atlantic Telephone Companies
1320 North Court House Road
Eighth Floor
Arlington, Virginia 22201

Wayne V. Black, Esq.
John Reardon, Esq.
Keller and Heckman
1001 G Street, N.W.
Suite 500 West
Washington, D.C. 20001
Of Counsel for American Petroleum Institute

Jeffrey L. Sheldon, Esq.
UTC
1140 Connecticut Avenue, N.W.
Suite 1140
Washington, D.C. 20036

Mr. David E. Laag
San Bernardino Microwave Society
247 Rebel Road
Ridgecrest, California 93555

Dr. Robert L. Riemer
HA-562
National Research Council
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

Caressa D. Bennet, Esq.
Law Offices of Caressa D. Bennet
1831 Ontario Place, N.W.
Suite 200
Washington, D.C. 20009
Counsel for Leaco Rural Telephone Cooperative, Inc.

Mr. James S. Kaplan
2373 NW 185th Avenue #280
Hillsboro, Oregon 97124

Jere W. Glover, Esq.
Barry Pineles, Esq.
Office of Advocacy
United States Small Business Administration
409 Third Street, S.W.
Washington, D.C. 20416

Ms. Phanie Sundheim
Ladybug Mountain PCS Corp.
90 Inverness Cir E
Englewood, Colorado

David M. Drucker, Esq.
P.O. Box 255
Evergreen, Colorado 80439
Counsel for Ladybug Mountain PCS Corp.

Nathan Wilson
11346-8 Portobelo Drive
San Diego, California 92124

Deborah Lipoff, Esq.
Associate General Counsel
Rand McNally & Company
8255 North Central Park
Skokie, Illinois 60076

Julie S. Read